

WHAT IS CLAIMED IS:

1 1. An apparatus for producing a composite material including
2 ceramic hollow particles and one of aluminum and aluminum alloy
3 comprising:
4 a molten stock vessel including a vessel body including a
5 gas inlet port at an upper part thereof and a molten stock outlet
6 port at a bottom thereof; a chamber formed in said vessel body
7 in a manner to intercommunicate said gas inlet port and said molten
8 stock outlet port, and accommodating therein molten aluminum or
9 molten aluminum alloy; a temporary sealing ceramic filter disposed
10 in said chamber as seated against said bottom of said chamber in
11 a manner to cover said molten stock outlet port;
12 a gas feeding member including a member body formed with
13 a gas infeed port for feeding a predetermined gas into the chamber
14 of said molten stock vessel, and disposed on the upper part of
15 said vessel body in a manner that said member body thereof covers
16 said gas inlet port as allowing said gas infeed port thereof to
17 be communicated with said gas inlet port;
18 a packing including a through hole and seated against the
19 bottom of said vessel body in a manner to allow the through hole
20 thereof to be communicated with said molten stock outlet port;
21 a forming mold including a mold body disposed under said
22 molten stock vessel with said packing interposed therebetween;
23 a slit formed in the mold body, communicated with the molten stock
24 outlet port of said vessel body via the through hole of said packing,

25 and accommodating therein a plurality of ceramic hollow particles;
26 a vent hole formed at said mold body in a manner to communicate
27 with the slit, and extended from a bottom of said mold body to
28 form an air vent;

29 an air-removal ceramic filter disposed under said forming
30 mold and seated against the bottom of said mold body in a manner
31 to cover said air vent; and

32 a pressure die for pressurizing an array of said gas feeding
33 member, said molten stock vessel, said packing, said forming mold
34 and said air-removal ceramic filter along the arrayed direction
35 thereby bringing these components into tightly contacted relation,
36 wherein when said predetermined gas is fed into the chamber
37 of said molten stock vessel via the gas infeed port of said gas
38 feeding member, the pressure of the gas causes said molten aluminum
39 or said molten aluminum alloy to flow through said temporary
40 sealing ceramic filter and into the slit of said forming mold and
41 then to fill in gaps between said plural ceramic hollow particles.

1 2. A method for producing a composite material including
2 ceramic hollow particles and one of aluminum and aluminum alloy
3 comprising the steps of:

4 loading an aluminum ingot or an ingot of aluminum alloy in
5 a chamber of a molten stock vessel dismounted from a predetermined
6 assembly position;

7 heating said molten stock vessel to melt said aluminum ingot

8 or said ingot of aluminum alloy into molten aluminum or molten
9 aluminum alloy;

10 heating and heat retaining a forming mold at a
11 predetermined temperature, the charging of plural ceramic hollow
12 particles in the slit of said forming mold and in parallel with
13 said melting step;

14 a pressurizing the component array along the arrayed
15 direction by a pressure die after terminating said heating and
16 heat retaining step for heating said forming mold and assembling
17 said molten stock vessel finished with said melting step on a
18 packing; and

19 infiltrating said molten aluminum or said molten aluminum
20 alloy in gaps between said plural ceramic hollow particles by
21 feeding said predetermined gas into the chamber of said molten
22 stock vessel via the gas infeed port of said gas feeding member
23 and utilizing the pressure of the gas to cause said molten aluminum
24 or said molten aluminum alloy to flow through said temporary
25 sealing ceramic filter and into the slit of said forming mold.

1 3. A method for producing a composite material including
2 ceramic hollow particles and one of aluminum and aluminum alloy
3 as claimed in claim 2, wherein the feeding of said predetermined
4 gas into the chamber of said molten stock vessel is terminated
5 after the temperature of said forming mold is lowered to below
6 a predetermined solidification temperature of said molten

7 aluminum or said molten aluminum alloy.

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1 4: " " A method for producing a composite material including
2 ceramic hollow particles and one of aluminum and aluminum alloy
3 as claimed in claim 2, wherein the composite material including
4 said plural ceramic hollow particles and one of aluminum and
5 aluminum alloy is released from the slit of said forming mold after
6 the temperature of said forming mold is lowered to below a
7 predetermined releasable temperature for the composite material.